but occur chiefly in the upper and middle water layers, being found during the daytime in greatest numbers about 50 fathoms below the surface. The inference is obvious that the female eels spawn on the bottom in the same or a neighbouring area to that in which the larvæ are taken. The highest point of larval development seems to occur in June; the Leptocephalus has then ceased to feed, and the next stage of its existence is a long, retrogressive metamorphosis, during which it decreases in size in all dimensions, and gradually takes on the slender eel-like form. During the latter part of the metamorphosis the larvæ, or elvers as they may now be called, become very active, and commence their great migration towards the coast and the fresh waters in which they feed and grow. The whole process of metamorphosis occupies about a year, and during this time the young eels take no food at all.

Schmidt has obtained information from localities all along the west coast of Europe, from Spain to Norway, as to the time of year when the young elvers first appear in the rivers, and the interesting fact comes out that the time of occurrence of the elvers on the different coasts depends, in the first place, on the distance from the deep water in the Atlantic where the eels spawn. On the coasts directly washed by the ocean the ascent into fresh water begins between September and December, or even in January or February, according to the distance from the deep water, whilst on the coast of Denmark and in the inner Danish waters the elvers do not arrive until April and May.

The whole story of the life of the common eel, as now made clear by these investigations, is one of the most fascinating which it has fallen to the lot of any naturalist to unravel. We can picture the great shoal of parent eels, the long journey from the inland waters ended, arriving at their proper spawning places in the deep Atlantic along the whole length of the European coast; the floating eggs gradually developing into transparent, deep-ribbon-shaped Leptocephali; the slow transformation to slender, active elvers; the vast multitude of elvers, foodless, their whole energy concentrated and spent in locomotion only, moving steadily in towards the coast, entering the rivers of Ireland and of France, entrapped in the great funnel of the Severn's mouth, pressing on through the English Channel and into the North Sea, a remnant only, when tribute has been paid to all the rivers by the way, reaching the fresh waters of Denmark and the Baltic coasts; and, finally, the feeding and growth of the eels all over the European continent in preparation for the return migration to the sea.

There can be little doubt that this new knowledge of the life-history of the eel will lead to results of great practical value to the eel fisheries of Denmark. The fact that one large market for Danish eels is in London makes the question one of practical interest to this country also. In the first place, Schmidt points out that since Denmark and the Baltic depend for their supply of young eels upon the general European stock coming from the Atlantic, any protection of the adult fish in Danish waters is quite uncalled for, since even if all the Danish and Baltic eels were caught, only an insignificant reduction in the number of eel larvæ in the deep waters of the Atlantic would result. In the second place, since the evidence seems to show that the main supply of young eels to the Baltic comes from elvers which have travelled through the English Channel, and not around the north of Scotland, only a remnant of the great shoal of migrating elvers reaches that coast, a view which is confirmed by the fact that in Danish rivers no such immense runs of elvers are known as are found in the Severn or in the rivers along the Atlantic sea-board. It would seem that whilst the latter rivers, owing to their geographical position and configuration, receive far more elvers than they are able to support, those of Denmark and the Baltic may have a deficient supply. Schmidt recommends, therefore, that elvers should be taken from the western rivers (elvers caught in large quantities in the Severn are sold at from 1*d.* to 2*d.* per pound, and one pound contains about 1500 individuals) and transferred to the Danish rivers and to the Baltic, where they are wanted, and where there is room for them to grow into large eels.

Lack of space precludes us from describing in the same detail as we have done for the plaice and the eel the work which is in progress in connection with the other food-fishes. Heincke's report on the occurrence and distribution of the eggs, larvæ, and various age-groups of the food-fishes in the North Sea (*Rapports et Procès-Verbaux*, vol. iii.), and the papers by Hjort and others on the life-history of the haddock and cod already referred to, clearly indicate results which may eventually be of even greater interest and importance than those described above.

It seems impossible, after an impartial consideration of the volumes before us, to come to any other conclusion than that the International Fishery Investigations are being conducted with marked energy and enthusiasm by all the countries engaging in them, and that the great conception of an international cooperation of men of science having for its object the acquirement of the knowledge necessary for the rational exploitation of the sea on a scientific basis is in a fair way to justify itself in the eyes of the world.

NOTES.

ON Monday last the Duke of the Abruzzi delivered to a large audience in the Argentine Theatre at Rome a lecture on his expedition to Ruwenzori, and was awarded the gold medal of the Geographical Society of Italy. The King and Queen of Italy were present with their full Court, and the Diplomatic Corps and chief officers of State also attended. The lecture will be repeated at a special meeting of the Royal Geographical Society to be held at the Queen's Hall, Langham Place, on Saturday, when the King and the Prince of Wales have signified their intention to be present.

WE regret to announce that Mr. Cornelius O'Sullivan, F.R.S., known chiefly by his investigations on scientific aspects of brewing, died on January 8, in his sixty-sixth year. We regret also to learn of the death of Mr. T. R. Dallmeyer, head of the famous optical firm, and formerly president of the Royal Photographic Society.

MAJOR E. H. HILLS, C.M.G., R.E., who has been appointed to inspect and report upon the survey departments now working in the protectorates of British East Africa and Uganda, has just left England for Mombasa. On the completion of the above-mentioned work he will proceed to Colombo to make a similar inspection in Ceylon.

A NEW Government farm, to be devoted wholly to tobacco research, is to be opened, says the *Pioneer Mail*, in the Rangpur district of Bengal, which is believed to contain perhaps the most important tobacco-growing area in the whole of India, the climate and soil in certain parts of the district being admirably suited to the cultivation of the crop.

SOLAR halos are not so rare as to be very remarkable meteorological phenomena, but a halo seen complete or in parts in the afternoon of January 4, in various parts of the country, seems to have excited some interest among people unfamiliar with its nature. At Hitchin the halo was first noticed about 2.15, and it lasted until about 3 o'clock, three-quarters of a complete circle being visible. A complete halo was noticed at Southampton and Worcester about 3 o'clock, and portions were observed near Ealing at 3.20, and at Chichester about 4 o'clock.

ON Tuesday next, January 15, Prof. Percy Gardner will deliver the first of two lectures at the Royal Institution on "The Sculpture of Aegina in Relation to Recent Discovery," and on Thursday, January 17, Dr. W. N. Shaw will begin a course of two lectures on "Recent Advances in the Exploration of the Atmosphere." The discourse on January 18 will be delivered by Sir Andrew Noble, Bart., K.C.B., on "Fifty Years of Explosives." Prof. W. W. Watts being unable to deliver his two lectures on the "Building of Britain" and "Recent Light on Ancient Physiographies" on Thursdays, February 14 and 21, Mr. Alfred Harker will deliver two lectures on those dates on "The Minute Structures of Igneous Rocks and their Significance."

A MAGNETIC survey of Mexico is now in progress under the joint auspices of the Mexican Government and the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. It is reported in *Science* that the Mexican Government has two parties in the field under the direction of the Observatorio Astronomico Nacional Mexicano, one having charge of the eastern part of the country and one of the western part, embracing the Pacific coast from Manzanillo to Guaymas, inclusive of Lower California. The Carnegie Institution party will confine operations to the part of Mexico north of the twenty-fifth parallel, upon the completion of which it will proceed to Campeche, Yucatan, and the Central American countries. It will be possible within the next year to construct accurate magnetic maps for the region between the parallels of latitude 20° and 49° north and meridians of longitude 65° and 125° west of Greenwich.

THE Harvard ethnological expedition to South America is now on its way to Arequipa, Peru, where it will make its headquarters for three years. It consists of Dr. W. C. Farabee, a Harvard instructor in anthropology, with two assistants, Mr. L. J. de Milhau and Mr. J. W. Hastings, with Dr. Edward F. Horr as physician to the party. Its main object is to collect all possible information about the little-known Indian tribes living on the headwaters of the Amazon and Parana on the east of the Andes. The only previous exploration in this region was that of Dr. Flick, a German man of science, who, however, covered only a small part of the territory that will now be visited. The expenses of the expedition will be met by a recent Harvard graduate. The Secretary of State has provided letters of introduction to various officials in South America, and assistance is also expected from the Harvard Observatory at Arequipa. Another scientific expedition in which Harvard is interested is that which Prof. Alexander Agassiz is projecting for February, when he will take a small party in a steam yacht for a cruise in the West Indies.

THE University of Michigan has come into possession of a tract of land which is to be developed into a garden meeting all the requirements of the present-day European botanic gardens. We learn from *Science* that the ground comprises about thirty acres, and is separated from the Huron River by an approximately equal area owned by the city of Ann Arbor. By an agreement entered into by the University and the council of the city, the two pieces of land are to be developed as one, thus ensuring a garden and park of at least sixty acres. The following four aims for its use will be observed in the development of the garden:—(1) teaching, in which students are instructed in the various orders and functions of plants; (2) scientific, in which genetic relationship is studied and experimental work is carried on; (3) economic, in which collections of medicinal and economic plants are made, and the effect of horticulture and agriculture is shown; and (4) æsthetic and popularly educational, in which special provision is made to make the plantings, the drives, and walks of interest and value to the public.

AN obituary notice of Prof. Ernesto Cesaro is contributed by Prof. Ernesto Pascal to part xvii. of the current number of the *Rendiconti* of the Lombardy Institution. Cesàro was born at Naples on March 12, 1859, and went to study in the School of Mines at Liége, where his brother had previously been appointed professor of mineralogy. He soon developed a taste for mathematics, and began to publish papers in *Mathesis* and elsewhere. In 1886 he presented more than a hundred papers in competition for university prizes at Messina on infinitesimal calculus, and at Naples on complementary algebra; and six years later, in awarding him the gold medal of the Italian "XL" Society, Beltrami alluded to about 200 papers, many of considerable length, from his pen. Cesàro returned from Belgium to study mathematics at Rome, but never consented to present himself for examination for the university degree. In 1886 he was appointed professor at Palermo, and was awarded an honorary degree by the University of Rome at the early age of twenty-seven. In 1891 he was transferred to Naples. His works deal with arithmetic, theory of functions, algebraic analysis, theory of elasticity, intrinsic geometry and infinitesimal calculu . On September 12, 1906, he was bathing with his son at Torre Annunziata, when a wave struck the boy. In attempting to rescue him the father was struck on the head, and both father and son perished together.

WE have received a copy of an address delivered by Prof. Carl Rabl, director of the Anatomical Institute at Leipzig, before the university of that city on June 21, 1906, and entitled "Uber 'Organbildene Substanzen' und ihre Bedeutung für die Vererbung" (published at Leipzig). One of the chief subjects discussed is the theory of the continuity of the chromosomes, that is to say, of the chromatic elements of the nucleus of the germ-cell. In conclusion, it is argued that the development of an organism must be regarded as a continuous chain of chemical progression, based upon and regulated by a definite anatomical substratum.

THE report of the Bristol Museum and Art Gallery for 1906 chronicles the results of the first complete year's working of the combined institutions, and it is satisfactory to learn that in every respect the authorities have reason to congratulate themselves on their efforts. The public has responded in an almost surprising manner to the attractions offered, the attendance during the year having exceeded half a million. In the natural history section groups of birds, both British and foreign, as well as one of tigers, have been set up for the museum by Rowland Ward, Ltd., and have proved highly attractive. In the list of big-game trophies the name of one animal is given as the "Burmese buffalo or gaur," which leaves

the reader in a happy state of ignorance as to the species really referred to.

THE whole of the second part of vol. vii. of the Bulletin of the Tokyo College of Agriculture is devoted to silk-worm culture and problems connected therewith, all three articles being from the pen of Mr. K. Toyama. Breeders, it appears, have a belief that if a male moth is mated with more than one female, the product of the later unions will be feeble. The author finds, however, that polygamy is a normal condition of the species, and that the reputed ill-effects of this habit are non-existent. The study of a fly parasitic on silk-worms forms the subject of the second article. In the third, the conformity or otherwise of hybrid silk-worms to the Mendelian law is discussed. Careful investigation has shown that, as regards the colour of the cocoons and eggs and the nature of the larval markings, Mendel's law is followed, although in respect to the shape of the cocoons and the brood-characters no adherence to this can be detected.

IN the twentieth annual report of the Liverpool Marine Biological Committee, or, in other words, the Marine Biological Station at Port Erin (Isle of Man), reference is made by Prof. Herdman to the urgent need of a steam-yacht for local collecting. For two months such a vessel was privately chartered, and employed in experimenting on the kinds of nets best suited for collecting micro-organisms, but, unfortunately, the funds at the disposal of the committee do not permit the permanent engagement of a steamer. The aquarium continues to form a great attraction to visitors, of whom more than 15,000 were recorded during the summer. Several invertebrates new to the fauna of the Irish Sea have been collected. The suitability to their purpose of the tanks is demonstrated by the fact that several organisms have made their appearance spontaneously, having gained entrance by way of the supply-pipes, some of which were blocked by the invasion. Care has to be taken in regard to placing animals together, as one rare anemone was devoured by a commoner kind, while it was found that the worm Nereis is in the habit of dragging Sabellæ from their tubes. The fact that the lugworm can swim is a new discovery. Prof. Herdman's address on "Some Problems of the Sea," referred to in our issue of last week, forms an appendix to the report.

IN the January issue of the *Century Magazine* Prof. H. F. Osborn describes a find of prehistoric crania from a mound in Douglass County, Nebraska. Of the six skulls discovered, two from an interment near the surface of the mound were of the modern Indian type; but beneath these, and covered by a layer of ashes resting on a stratum of silt compacted by the fire above, four skulls of a remarkable character were unearthed. The only implement found with them was a small, broken, triangular flint knife. Unfortunately, the back part of each of these crania is wanting, but the portions which remain exhibit low cranial capacity, and are believed to approximate to the Australian type. The supra-orbital ridges are not more pronounced than those of the Australian, but the forehead is even more flattened and receding. These skulls, which have been deposited in the museum of the University of Nebraska, indicate a race of low cerebral capacity, inferior to the modern Indians or the typical American mound-builders. Their average stature was about 5 feet 10 inches. Compared with typical primitive forms—those of the Javan *Pithecanthropus erectus*, that of Gibraltar, and the Neanderthal skull—the American specimens seem to represent a class more recent than the last. It would be rash to speculate on the importance of this discovery until the missing portions can be recovered or more perfect specimens unearthed. "Even if not of great antiquity," says Prof. Osborn, "it is certainly of a very primitive type, and tends to increase rather than diminish the probability of the early advent of Man in America." The same issue of this magazine contains President Roosevelt's enthusiastic account of ancient Irish Sagas, in the course of which he takes occasion to advocate the foundation of chairs of Celtic in the universities of America.

THE latest issue—a double number—of *Le Bambou*, dated mid-December, completes the first volume. The articles include a note on the indigenous localities of species of Phyllostachys, an account of the vegetative development of bamboos, and a report on the growth of the species cultivated at Ermitage during the year.

AMONG the papers read before the Botanical Society of Edinburgh, and published in the second part of vol. xxiii. of the Transactions and Proceedings, Mr. J. A. Alexander communicates an article on the flora of Portuguese East Africa, with illustrations, detailing the more conspicuous plants. The dominant order is Compositæ, containing several species of Vernonia, Helichrysum, and Senecio, but the Leguminosæ and Euphorbiaceæ are more interesting and useful. Of Landolphia rubber vines only the species *florida* and *petersiana* are mentioned. An account of the extra-tropical trees planted and grown in Arran by the Rev. D. Landsborough testifies to the mildness of the seasons in parts of Scotland, as the list includes species of the Chamærops palm, the palm-lily Cordyline, Eucalypts, and numerous bamboos; measurements of the height and girth of the trees are recorded. The discovery of an evergreen Cystopteris by Mr. W. Young in Aberdeenshire, that receives the name of *C. fragilis*, var. *sempervirens*, is noteworthy.

IT is annoying, but often necessary, when the names of a group of economic plants are revised to find familiar designations displaced by others more justifiable. The limits of the genus Andropogon have always been uncertain, and consequently, in working out the nomenclature of the oil-grasses of India and Ceylon, to which subject the whole of the eighth number of the *Kew Bulletin* is appropriated, Dr. O. Stapf has found it necessary to transfer ten species to the genus Cymbopogon, to re-christen the species *muricatus*, better known as "khas-khas," by the name of *Vetiveria zizanioides*, and to retain under Andropogon only the insignificant species *odoratus*. This, however, is only a portion of the tangle Dr. Stapf has endeavoured to unravel. The following names are given to the commercial oils:—citronella oil is *Cymbopogon nardus*; lemon-grass oil is *C. citratus*; the lemon-grass oil of Malabar or Cochin becomes *C. flexuosus*; Rusa grass or palmarosa oil, *C. martini*; and *C. schoenanthus* is limited to the "izkhir" of Arabia, that receives the appellation of camel-grass oil.

IN the Journal of the Franklin Institute (vol. clxii., No. 6) it is announced that Mr. E. G. Acheson, of Niagara Falls, has succeeded in making soft graphite artificially. Hitherto the artificial product has been hard graphite, which has been used in the manufacture of electrodes and as a pigment. The soft graphite will be used as a lubricant, as a stove polish, for electrotyping, and for coating gunpowder.

THE *Pioneer Mail* of December 14, 1906, directs attention to the extraordinary development of the manganese ore industry of India since the discovery in 1896 by Mr.

H. G. Turner of the commercial value of the manganese ore in the Vizianagram district of the Madras Presidency. It is evident that India will soon stand first as the largest producer of manganese ore in the world.

IN *Concrete and Constructional Engineering* (vol. i., No. 6) there is an admirably illustrated article dealing with reinforced concrete bridges, by Mr. W. N. Twelvetrees. The article on steel and concrete at the Ritz Hotel, London, describes a striking example of steel-frame construction encased in concrete. A new use for concrete is indicated in the description of a gas-holder tank of reinforced concrete, 84 feet in diameter and 21 feet deep, at Dubuque.

THE annual retrospects published by the engineering journals are of great value for reference to workers in other fields. The report on the year's progress published in the *Engineer* of January 4 is the most exhaustive that has appeared. It covers the domains of mechanical engineering, civil engineering, water supply, gas supply, war material, chemistry, metallurgy, electrical engineering, and sanitary engineering. In the special field of mining and metallurgy the report in the *Mining Journal* of December 29, 1906, is the most complete. The report on shipbuilding, in *Engineering* of January 4, shows that the past year has been very remarkable so far as marine construction is concerned. The tonnage produced in the United Kingdom, 2,030,990 tons, is the highest yet reached.

WE have received from Mr. U. S. Grant a copy of a report he has prepared for the United States Geological Survey (Bulletin No. 284) on the mineral resources of Prince William Sound, on the north side of the Gulf of Alaska. Two mines on the shores of the Sound have demonstrated that copper ore of good grade occurs in the district. Erosion in very recent time has been general, so that no considerable secondary concentration of ores exists. The ores of possible commercial importance have all the characteristics of primary deposits, and irregularity of form is to be expected. Developments should consequently be confined to following the ore.

THREE memoirs (*Boletins* Nos. 40, 42, and 43) issued by the Corps of Mining Engineers of Peru afford striking evidence of the careful attention that is now being devoted by the Peruvian Government to the subject of irrigation. In *Boletin* No. 40 Mr. G. I. Adams discusses the distribution of water in the departments of La Libertad and Ancachs, the memoir being accompanied by a coloured hydrological map. In *Boletin* No. 42 Mr. A. I. Stiles gives the results of a careful technical investigation of the lagoons of Huarochiri, in the department of Lima. He appends a contoured map showing the position of the lagoons, and a map illustrating his scheme for increasing their capacity. In *Boletin* No. 43 Mr. C. W. Sutton and Mr. A. I. Stiles deal with the water supply of the department of Piura.

THE United States Geological Survey continues to devote special attention to the investigation of the mineral resources of Alaska. The resources of Kenai Peninsula, in the most northern portion of the great upward bend of that part of the Pacific coast-line enclosing the Gulf of Alaska, form the subject of an interesting report by Mr. F. H. Moffit and Mr. R. W. Stone (Bulletin No. 277). The former deals with the goldfields of the Turnagain Arm district, where gold in the stream gravels is very unevenly distributed; and the latter describes the coalfields of the Kachemak Bay region, where lignites occur in beds ranging up to 7 feet in thickness, but of low heating power. The geology and coal resources of the Cape Lisburne region are dealt with by Mr. A. J. Collier (Bulletin No. 278). The coals are of two classes, low-grade bituminous coal of Mesozoic age and high-grade bituminous coal of Palæozoic age. The Mesozoic coalfields cover an area of more than 300 square miles, and contain at least 150 feet of coal distributed in forty or fifty seams, ten of which are more than 4 feet thick. The Palæozoic coals occur in limited areas, and the beds are much crumpled and broken, but on account of their good quality will in the future contribute an appreciable addition to the value of the mineral output of Alaska. The Rampart gold-placer region in the central part of Alaska is described by Mr. L. M. Prindle and Mr. F. L. Hess (Bulletin No. 280). The placers are of two general types as regards their origin, placers of ordinary concentration from the disintegration of the bed rock and placers formed through reconcentration of the gold in older gold-bearing gravels by the cutting of streams. The gold of the re-concentrated placers is generally smoother and brighter than that from the others, contains less quartz and iron, and is, therefore, higher in value per ounce. The gold has probably come from comparatively small veins distributed through the surrounding rock.

A SERIES of experiments has been carried out, the *Pioneer Mail* states, at the Plague Research Laboratory at Bombay with the view of determining the germicidal properties of pure nickel and nickel alloy, and to test the possibility that disease might be conveyed by coins. Pure nickel, nickel and copper, copper, and silver coins were experimented with, and the results are said to show that all the coins had bactericidal action on the plague bacillus.

THE law of error forms the subject of several recent papers, including two by Prof. C. V. L. Charlier, in the *Arkiv für matematic Astronomi och Fysik* (Stockholm), ii., 8, 15, and one by Prof. F. Y. Edgeworth in the Journal of the Royal Statistical Society, lxix., 3. These papers deal with the cases in which the frequency curve consists of a series of terms of which the first term represents the ordinary well-known "law of error," and the diagrams showing the effect of the succeeding terms, which Prof. Edgeworth reproduces from Prof. Charlier's "Researches into the Theory of Probability," will give non-mathematical readers a good general idea of the effect of the corrections on the form of the curve.

UNDER the title *Rivista di Scienza*, a new Italian journal is announced dealing with questions of a general nature relative to various branches of science and the connection between them. Contemporaneously with the Italian edition, an international edition will be published containing original contributions printed in either of the four principal international languages in which they are written. The managing committee consists of Profs. Giuseppe Bruni (Parma), Antonio Dionisi (Modena), Federico Enriques (Bologna), Andrea Giardina (Pavia), and Ingegnere Eugenio Rignano (Milan). The editorial secretary is Dr. Giuseppe Jona, Milan, Via Aurelio Saffi, 16.

THE Decimal Association has recently issued two more pamphlets. One, which is sold at 3*d.*, gives Lord Kelvin's views on the advantages of the metric system, the opinions of numerous other eminent men, and explanatory tables; the other, by Mr. S. Jackson, is entitled "The Inch Absurdity," and is intended to demonstrate "the utter folly and impossibility' of recent proposals to adopt the

inch, square inch, and cubic inch as standards of length, area, and volume, and the weight of a cubic inch of water at a certain temperature as the standard of weight.

THE issue for 1907 of the "Science Year-book, with Astronomical, Physical and Chemical Tables, Summary of Progress in Science, Bibliographies and Diary," edited by Major B. F. S. Baden-Powell, and published by Messrs. King, Sell and Olding, Ltd., differs little from that of last year. A general article of fewer than ten pages on the progress of science in 1906 has superseded the comparatively full summaries in various scientific subjects given in former years. We observe that the "Year-book" can be obtained in an abridged form without the diary.

THE twenty-third annual issue of the "Year-book of the Scientific and Learned Societies of Great Britain and Ireland," which has been published by Messrs. Charles Griffin and Co., Ltd., provides a convenient short record of the work done by numerous societies and Government institutions in science, literature, and art during the session 1905–6. The information has been compiled from official sources, and the majority of societies and associations included in the volume have demonstrated, by published papers, their activity in extending and disseminating knowledge. The editor may be congratulated upon the production of a work of reference which is of distinct service.

A PRICE-LIST of invar and its applications, issued by Mr. J. H. Agar Baugh, 92 Hatton Garden, E.C., contains some interesting notes on the specific properties of this valuable alloy of nickel-steel. Invar is sold in three grades, and the guaranteed maximum of the coefficient of expansion of the middle quality is only 0·0000015 per 1° C., while that of the highest grade is much less. For pendulum rods, compensation balances for marine chronometers and pocket watches, standard measures of length, tapes for measuring base-lines, and many other purposes, invar has proved particularly valuable, and its use in scientific instruments is likely to be greatly extended.

THE first number of a new weekly journal known as *Electrical Engineering* was published on January 3. The periodical will deal with the subject of electrical engineering, particularly from the practical and utilitarian aspect, and is intended for the engineer rather than the electrician. The number of well-reproduced drawings to scale and of special photographs showing details of constructional work is large, and the paper is, as a whole, particularly attractive. Among other articles may be noticed one on the new Great Northern, Piccadilly, and Brompton Railway, and an incidental reference in another part of the paper gives the information that all the rolling-stock for the latest tube is of Continental manufacture. If the standard of the first number is maintained, the new periodical should have a successful career.

OUR ASTRONOMICAL COLUMN.

EPHEMERIS FOR COMET 1906*g* (THIELE).—A further ephemeris for comet 1906*g*, extending to February 16, is given in No. 4143 of the *Astronomische Nachrichten* by Herr Georg Dybeck. This ephemeris shows that the comet is now (January 10) about 1° north of θ Draconis, and is only about one-third as bright as when discovered.

THE OBSERVATION OF TOTAL SOLAR ECLIPSES.—Observers of total eclipses of the sun will find much to interest them in the address delivered by M. le Comte A. de la Baume Pluvinel to the Astronomical Society of France, and published in the Bulletin for December, 1906.

The lecturer dealt chiefly with the details of the preliminary preparations, which commence at the moment that the astronomer decides to observe the eclipse—usually some months before the actual day—and are not concluded until the observations are actually in progress. In eclipse reports these preparations are generally only summarily dealt with, and the inexperienced reader will be surprised, on reading the lecture, to learn of the innumerable *minutiae* which *have* to be considered and dealt with if success is to attend the observations. The lecturer also named the most famous eclipse observers in the several countries which have participated in these important observations, directing special attention to any exceptional methods employed, as, for example, the utilisation of men-of-war and their trained *personnel* by Sir Norman Lockyer at several eclipses.

OBSERVATIONS OF MARS.—In the December (1906) number of the *Bulletin de la Société astronomique de France*, M. José Comas Sola, director of the Fabra Observatory (Barcelona), gives an illustrated account of his observations of Mars during the opposition of 1905. The following points, among others, are worthy of notice:—On April 26 M. Sola saw a "*lac*" at the intersection of Phison and Orontes, and the Euphrates, although perfectly visible, was always diffuse, despite the fact that, at times, the seeing was very good. On April 28 changes were observed which were evidently due to atmospheric changes on the planet. The "seeing" on May 9 was superb, and, as shown by the drawing for this date, "*canaux*" and "*lacs*" were seen very distinctly, the latter forming the corners of the pentagon around the Elysium. The Propontis was seen to be rather dark and double, with good "seeing," on May 17, at 11h. 40m. (G.M.T.), but at 12h. 40m. it seemed quadruple, formed by four "*lacs*" disposed at the corners of a square.

TRANSIT-CIRCLE OBSERVATIONS.—Parts i. to iii., vol. iv. (second series), of the Publications of the U.S. Naval Observatory contain a large number of transit-circle observations, with their discussions and reductions.

In part i. the observations made with the 6-inch transit circle during the period 1900–3 are dealt with and the results tabulated. It is interesting to note that whilst the variations of this instrument are much smaller since the substitution of brick for stone piers, they are still important, and Prof. Littell, from a discussion of the constants for 1903, shows that they are dependent upon the temperature variations. The azimuth constant shows a regular annual variation of −0·011s. per 1° F., and a diurnal variation of about half that amount. In part ii. the observations made during 1866–91 are collected and discussed in a uniform manner, whilst part iii. is devoted to the discussion of the 6-inch transit-circle observations of standard and zodiacal stars made during 1901 and 1902.

THE "COMPANION TO THE OBSERVATORY."—Only a few changes are to be noted in the current issue of the indispensable annual the "Companion to the Observatory."

Owing to the continued increase in the number of known variable stars, the list of ephemerides supplied by M. Lœwy is given in a somewhat different form, and the Greenwich mean astronomical time, from noon to noon, has been substituted for the civil, midnight to midnight, time employed in recent years. The addition of stars fainter than magnitude 6·5 has increased the number of lunar occultations given. The usual diagram of Saturn's satellites is omitted, because their plane passes through the earth during the current year. The "Companion" is published by Messrs. Taylor and Francis, price 1*s.* 6*d.*

"THE HEAVENS AT A GLANCE, 1907."—For all who take an interest in astronomical phenomena, and have but little time to spare and but modest instrumental equipment, Mr. Mee's card, "The Heavens at a Glance," is the handiest and cheapest calendar published. As in previous issues, it gives the chief events for each month, the dispositions of the sun, moon, and planets throughout the year, notes on eclipses, meteor showers, and variable stars, and a pair of star maps by which the observer may recognise the chief constellations and stars at any season of the year The price is sevenpence, post free, from Mr. A. Mee, Llanishen, near Cardiff.